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**(54) Sheets with a volatile compound**

(57) The present invention provides sheets preserving a compound being volatile at room temperature, wherein plural sheets comprising of the compound being volatile at room temperature are constructed as layers.

The sheets can continue to volatilize an ingredient (a pest-controlling agent, perfume, insecticidal compound, etc. which are volatile at room temperature) after a long period of time passes.

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## Description

[0001] The present invention relates to a stack of sheets preserving a compound or compounds being volatile at room temperature (hereinafter referred to as volatile compound) and particularly when the volatile compound is an insecticidal or aroma chemical compound.

[0002] The art in which a sheet preserves a volatile compound is well known. Such a sheet usually is placed where the surrounding environment fit the purpose of the preserved compound and is set to vaporize the preserved compound(s). However, the employment of a single sheet has limits and may be considered unsatisfactory. A large part of the preserved compound vaporizes after a relatively short period of time and cannot be efficient to vaporize the same compound for a relatively long period of time. Therefore, it would be a distinct advantage if a sheet model can vaporize the preserved compound for a long period of time. The longer vaporization period will allow the sheet model to extend its uses as an air refresher, insecticide and/or pest repellent.

[0003] The goal of the present invention is to have a stack of sheets preserving a volatile compound, to comprise of the ability to vaporize the preserved volatile compound after a relatively long period of time.

[0004] The sheets of the present invention are employed as a stack of sheets. By stacking plural sheets that preserve the volatile compound, vaporization continues after a long period of time. As the number of sheets increase, the vaporization within the sheets that preserve the volatile compound is suppressed, favorably causing the compound to continually vaporize after a long period of time. The number of sheets in the present invention is generally at least 10 sheets, for example 10 to 1000 sheets, preferably having at least 20 sheets, for example 20 to 500 sheets.

[0005] The size of the sheet preserving the volatile compound is not especially limited but the object of use, variation of sheets material, variation of compound, and a consideration for the surrounding environment in setting may be factors influencing the size of the sheet. To generally fulfill these factors, a sheet of 20 to 1000cm<sup>2</sup> usually is employed. The thickness of the said sheet is also not limited, but a thickness of 20 to 200μm may be preferable.

[0006] Materials to fabricate the sheet employed in the present invention are also not especially limited, and for example, papers; synthetic resins such as polyesters and polyamides; aluminum; and so on may be employed. Furthermore, employing sheets wherein synthetic resin(s) cover(s) the surface of paper or aluminum is possible.

[0007] The compound in the present invention may be any volatile compound that has the ability to readily vaporize at room temperature or more particularly, when the vapor pressure is at least  $1 \times 10^{-4}$  mmHg at

20°C. Such volatile compounds may be the active ingredient found in insecticides, acaricides, noxious pest repellents that are pest controlling compounds or the active ingredient found in perfumes that are aroma chemicals.

[0008] Specific examples for insecticidal compounds recited above are N,N-diethyl-m-toluamide, carane-3,4-diol, and pyrethroid compounds such as 1-ethynyl-2-methyl-2-pentenyl (1R)-3-(2-methyl-1-propenyl)-2,2-dimethylcyclopropanecarboxylate (common name: empenethrin); 2,3,5,6-tetrafluorobenzyl (1R)-trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate (common name: transfluthrin); 1-ethynyl-2-methyl-2-pentenyl 3-(2-chloro-2-fluorovinyl)-2,2-dimethylcyclopropanecarboxylate; 2,3,5,6-tetrafluoro-4-methylbenzyl 3-(2-methyl-1-propenyl)-2,2-dimethylcyclopropanecarboxylate; 2,3,5,6-tetrafluoro-4-methylbenzyl 3-(2-chloro-2-fluorovinyl)-2,2-dimethylcyclopropanecarboxylate; and 2,3,5,6-tetrafluoro-4-methylbenzyl 3-(1-propenyl)-2,2-dimethylcyclopropanecarboxylate.

[0009] To preserve the volatile compound in the employed sheet, the compound itself or a solution comprising the compound is impregnated or soaked onto the sheet. The said solution may be any solution wherein the compound is dissolved in any solvent such as acetones and/or alcohols (for example, methanol, ethanol, isopropyl alcohol). An unlimited amount of the volatile compound may be preserved in the sheet but the object of use, variation of sheet material, variation of compound, and a consideration for the surrounding environment are factors that may influence the amount of preservation. In the situation of utilizing the insecticidal compound of empenethrin, 0.5 to 20 grams of the said insecticidal compound per 1m<sup>2</sup> of sheet surface area (0.5 to 20 g/m<sup>2</sup>) may be utilized.

[0010] The method to incorporate the compound is not limited. The volatile compound may be impregnated or soaked to the sheet(s) before or after the sheets are stacked together.

[0011] To produce high results with the present invention, the most outer layering sheet may be separated from the stack, so the inner sheet is left to be exposed to the surrounding environment. The most outer layering sheet tends to loose the ability to vaporize first, and should be separated when vaporization no longer continues in the most outer sheet. Once the outer sheet is separated, the inner sheet wherein a copious amount of the compound still exists, may be exposed to the environment.

[0012] The present invention also takes various forms of construction. In the event of constructing the sheets to be a bound stack, an adhesive agent may be disposed on one side of each sheet and a releasing agent may be disposed on the other side. The side wherein the adhesive agent has been disposed may then unite a side from another sheet in which the releasing agent has been disposed. Free sheets may then be united with the plurality of sheets which have already been

united. Accordingly, the most outer layering is made easily detachable. A "memo pad-like calendar" which is a construction wherein the sheets are categorized by a day or days and are torn away from the calendar after the day or days pass, is produced in similar fashion.

## EXAMPLES

[0013] Hereinafter, the present invention will be explained in detail with the examples.

### Example 1

[0014] By impregnating a 30cm x 20cm "memo pad-like calendar" (365 sheets of paper) with 1g of empenethrin (a pyrethroid compound), the sheets with a volatile compound for the present invention are obtained. The obtained sheets with a volatile compound may be utilized by locating on pillars and/or walls indoors, to control flies and mosquitoes indoors.

### Example 2

[0015] Fifty grams of 1-ethynyl-2-methyl-2-pentenyl (1R)-trans-3-(2-chloro-2-fluorovinyl)-2,2-dimethylcyclopropanecarboxylate was impregnated onto a 30cm x 20cm "memo pad-like calendar" (365 sheets of paper) in order to obtain the sheets with a volatile compound for the present invention. The obtained sheets with a volatile compound may be utilized by locating on pillars and/or walls indoors, to control flies and mosquitoes indoors.

### Example 3

[0016] Twenty grams of 2,3,5,6-tetrafluoro-4-methylbenzyl (1R)-trans-3-(2-methyl-1-propenyl)-2,2-dimethylcyclopropanecarboxylate was impregnated onto a 30cm x 20cm "memo pad-like calendar" (365 sheets of paper) in order to obtain the sheets with a volatile compound for the present invention. The obtained sheets with a volatile compound may be utilized by locating on pillars and/or walls indoors, to control flies and mosquitoes indoors.

### Example 4

[0017] Ten grams of 2,3,5,6-tetrafluoro-4-methylbenzyl 3-(2-chloro-2-fluorovinyl)-2,2-dimethylcyclopropanecarboxylate was impregnated onto a 30cm x 20cm "memo pad-like calendar" (365 sheets of paper) in order to obtain the sheets with a volatile compound for the present invention. The obtained sheets with a volatile compound may be utilized by locating on pillars and/or walls indoors, to control flies and mosquitoes indoors.

### Example 5

[0018] Five grams of 2,3,5,6-tetrafluoro-4-methylbenzyl (1R)-trans-3-((Z)-1-propenyl)-2,2-dimethylcyclopropanecarboxylate was impregnated onto a 30cm x 20cm "memo pad-like calendar" (365 sheets of paper) in order to obtain the sheets with a volatile compound for the present invention. The obtained sheets with a volatile compound may be utilized by locating on pillars and/or walls indoors, to control flies and mosquitoes indoors.

### Example 6

[0019] With thirty 10cm x 10cm sheets, 200mg of a rose perfume was applied to the side wherein the releasing agent is disposed. After pasting an adhesive agent to the backside of the side wherein the releasing agent has been disposed, the side wherein the releasing agent has been disposed and a side from another sheet wherein the adhesive agent has been pasted were layered to unite. Accordingly, the sheets with a volatile compound for the present invention is obtained. The obtained sheets with a volatile compound may be utilized by locating in bathrooms, men's and ladies' rooms as an aromatic sample.

## Claims

1. Sheets preserving a compound being volatile at room temperature, wherein plural sheets comprising the compound being volatile at room temperature are constructed as layers.
2. The sheets according to claim 1, wherein the compound being volatile at room temperature is an insecticidal compound or an aroma chemical compound.
3. The sheets according to claim 1, wherein the compound being volatile at room temperature is selected from  
N,N-diethyl-m-toluidide; carane-3,4-diol; 1-ethynyl-2-methyl-2-pentenyl (1R)-3-(2-methyl-1-propenyl)-2,2-dimethylcyclopropanecarboxylate; 2,3,5,6-tetrafluorobenzyl (1R)-trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate; 1-ethynyl-2-methyl-2-pentenyl 3-(2-chloro-2-fluorovinyl)-2,2-dimethylcyclopropanecarboxylate; 2,3,5,6-tetrafluoro-4-methylbenzyl 3-(2-methyl-1-propenyl)-2,2-dimethylcyclopropanecarboxylate; 2,3,5,6-tetrafluoro-4-methylbenzyl 3-(2-chloro-2-fluorovinyl)-2,2-dimethylcyclopropanecarboxylate; and 2,3,5,6-tetrafluoro-4-methylbenzyl 3-(1-propenyl)-2,2-dimethylcyclopropanecarboxylate.
4. The sheets according to claim 1, wherein the number of sheets is 10 or more.

5. The sheets according to claim 1, wherein each sheet that preserves a compound being volatile at room temperature has an adhesive agent disposed on one side, and has a releasing agent disposed on the other side, so the side disposed with the adhesive agent and a side from another sheet in which the releasing agent has been disposed are positioned together to unite. 5
6. The sheets according to claim 1 that has a layered construction as a "memo pad-like calendar." 10

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# EUROPEAN SEARCH REPORT

Application Number  
EP 98 12 1108

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	<p>DATABASE WPI Derwent Publications Ltd., London, GB; AN 94-290503 XP002094067 NIPPON PETROCHEMICALS : "Active agent contg. multilayered sheets for insecticides and deodorants-with base layer, active agent layer and release layer in each sheet" * abstract * &amp; JP 06 218866 A</p>	1-6	<p>A01N25/18 A61L9/04</p>
A	<p>US 3 785 561 A (CONFINO ET AL.) 15 January 1974</p>		<p>TECHNICAL FIELDS SEARCHED (Int.Cl.6)</p> <p>A01N</p>
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>19 February 1999</b>	Examiner <b>Fort, M</b>
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

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